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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/783,621

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Anoop Mukker

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EXAMINER

PATEL, KAUSHIKKUMAR M

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/783,621	Applicant(s) MUKKER ET AL.	
	Examiner Kaushikkumar Patel	Art Unit 2188	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,6-8,10-16,18-22 and 24-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4,6-8,10-16,18-22 and 24-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This Office Action is in response to applicant's communication filed September 11, 2008 in response to PTO Office Action mailed June 11, 2008. The applicant's remarks and amendments to the claims and/or specification were considered with the results that follow.

2. In response to last Office Action, claims 1, 7, 10, 13, 19, 25 and 30 have been amended. No claims have been canceled. No claims have been added. As a result, claims 1-4, 6-8, 10-16, 18-22 and 24-34 remain pending in this application.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4, 6-8, 10-16, 18-22, and 24-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cai et al. (US Patent No. 6,349,363 (herein after Cai)) and further in view of Gaither (US Patent No. 6,223,256) and Vondran, Jr. (US Patent No. 6,243,791) (Vondran herein after).

5. **Regarding Claims 1, 7, 13, 19, and 25**, Cai discloses partitioning a cache array into one or more special-purpose entries and one or more general-purpose entries (**Cai: Column 2, Lines 57-60**), wherein special-purpose entries are only allocated for one or more streams having a particular stream ID, wherein the stream ID is stored outside the cache array; (**Cai: Column 3, Lines 43-49 and Column 4, Lines 25-42**).

Cai fails disclose but in analogous art, Gaither discloses wherein the special-purpose entries to use a first cache replacement algorithm and the one or more general-purpose entries to use a second cache replacement algorithm, wherein the first and second cache replacement algorithms are different (**Gaither: column 4, lines 23-40**; **“another section may provide cache space for code or data having temporal locality with replacement based on which line is least recently used, and still another section may provide cache space for code or data having spatial locality with a replacement algorithm that replaces lines based on a first-in-first-out algorithm”**.). At the time of the invention it would have been obvious to one having ordinary skill in the art to provide different replacement algorithm as taught by Gaither in the system of Cai to optimize cache performance for wide verity of applications by having different data characteristics (**Gaither: column 4, lines 23-29**).

Cai and Gaither fail to disclose but in analogous art Vondran discloses determining if a cross-access scenario exists between at least one of the one or more special purpose entries and at least one of the one or more general purpose entries; and if the cross-access scenario exists, permitting cross-access of data between the at least one of the one or more special-purpose entries and the at least one of the one or

more general-purpose entries that relate to the cross-access scenario. **(Vondran: abstract, “an address value of a data access request from a CPU is compared to all cache sets within cache regardless of the type of data and the type of data access indicated by the CPU”; Column 4, Lines 26-34, “since data can have temporal and spatial access characteristics in different portions of processing, the same data may end up residing in several caches at the same time”).**

At the time of the invention it would have been obvious to one of ordinary skill in the art to provide cross-access to the different classes/types (e.g. temporal and spatial data) of data as taught by Vondran in the system of Cai and Gaither.

The motivation for doing so would have been ensuring the coherency of the cached data and therefore improving system efficiency. **(Vondran: Column 4, Lines 26-34. column 5, lines 40-43).**

Therefore it would have been obvious to provide the cross-accessing capability of Vondran in the system of Cai and Gaither for the benefit of ensuring the coherency of the cached data and therefore improving system efficiency to obtain the invention as specified in claim 1.

Regarding Claims 2, 8, 14, 20, and 30, the combination of Cai, Gaither and Vondran discloses the claimed invention as stated supra. Further, Cai discloses allocating the one or more special purpose entries based on the particular stream ID and a particular input address. **(Cai: Column 3, Lines 43-49 and Column 4, Lines 25-42 and Figure 3, Element 162).** The EID coupled with input address locate where

the entries, in the cache, will be placed. A cache input address is inherent in accessing stored data because that is how data is located in a cache.

Regarding Claims 3, 15, and 21, Cai discloses storing data from the one or more streams in the one or more special-purpose entries when the particular stream ID and the particular input address match a predetermined stream ID and a predetermined input address; and storing data from the one or more streams in the one or more general-purpose entries when the particular stream ID and the particular input address do not match the predetermined stream ID and the predetermined input address. **(Cai: Column 3, Lines 43-49 and Column 4, Lines 25-42 and Figure 3, Element 162).** The EID coupled with input address locate where the entries, in the cache, will be placed. A cache input address is inherent in accessing stored data because that is how data is located in a cache. The general-purpose entries would be stored in the default cache with the “default EID identifier”.

Regarding Claims 4, 10, 16, 22, 28, 29, 31, and 32, Cai discloses determining when the particular stream ID and the particular input address match the predetermined stream ID and the predetermined input address using special-purpose control logic. **(Cai: Column 3, Lines 1-13 and Column 4, Lines 9-25 and Column 5, Line 62 – Column 6, Line 7).** The memory controller manages multiple cache partitions and is able to differentiate multiple EIDs. Being able to differentiate between more

than two EIDs shows that special logic is used to determine the cache location from the address and EID.

Regarding Claims 6, 12, 18, 24, 26, 34, Cai discloses wherein the special-purpose stream includes a data stream and wherein the system contains an I/O hub interface connected to a bus, a processor interface; and a host AGP controller connected to the system memory controller via the bus; wherein the cache array receives the cache operation requesting data via the one or more interfaces, and returns a cache hit in response to the cache operation, wherein the cache has a pending fetch for the data in response to a prior cache operation requesting the data.

(Cai: Column 6, Line 60 – Column 7, Line 5)

Regarding Claim 11 and 33, Cai discloses a DRAM controller integrated with the cache memory array. **(Cai: Column 5, Lines 12-16) A DRAM is controlled by a DRAM controller.**

Regarding Claim 27, Cai discloses wherein the processor interface connects a plurality of processors **(Figure 2 and Column 6, Line 44 – Column 7, Line 14)**, the plurality of processors including a 16-bit processor and a 64-bit processor. **From Figure 2 it can be seen that the caches are connected to a memory hub. Also connected to the hub are many devices. The text also discloses the caches connected to the multiple devices and controllers. The various devices and controllers inherently**

have their own processors. Therefore disclosing a plurality of processors. The size of the processors is a design choice and therefore does not carry patentable weight.

Response to Arguments

6. Applicant's arguments filed on 19 March 2008 have been fully considered but they are moot in view of new grounds of rejections.

7. Regarding all other Claims not specifically traversed above and whose rejections were upheld, the Applicant contends that the listed claims are allowable by virtue of their dependence on other allowable claims. As this dependence is the sole rationale put forth for the allowability of said dependent claims, the Applicant is directed to the Examiner's remarks above. Additionally, any other arguments the Applicant made that were not specifically addressed in this Office Action appeared to directly rely on an argument presented elsewhere in the Applicant's response that was traversed, rendered moot or found persuasive above.

Conclusion

8. The examiner also requests, in response to this Office action, support be shown for language added to any original claims on amendment and any new claims. That is, indicate support for newly added claim language by specifically pointing to page(s) and

line no(s) in the specification and/or drawing figure(s). This will assist the examiner in prosecuting the application.

9. When responding to this office action, Applicant is advised to clearly point out the patentable novelty which he or she thinks the claims present, in view of the state of the art disclosed by the references cited or the objections made. He or she must also show how the amendments avoid such references or objections See 37 CFR 1.111(c).

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaushikkumar Patel whose telephone number is (571)272-5536. The examiner can normally be reached on 7.30 am - 4.00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sam Sough can be reached on 571-272-6799. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Hyung S. Sough/
Supervisory Patent Examiner, Art Unit

Kaushikkumar Patel
Examiner

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